



US009638413B2

(12) **United States Patent**
Lau et al.

(10) **Patent No.:** **US 9,638,413 B2**

(45) **Date of Patent:** ***May 2, 2017**

(54) **TREATMENT DEVICE OF A HEATING SYSTEM**

(71) Applicants: **James H Lau**, Alexandria, VA (US);
Luis Murillo, Alexandria, VA (US)

(72) Inventors: **James H Lau**, Alexandria, VA (US);
Luis Murillo, Alexandria, VA (US)

(73) Assignee: **ProGreen Labs, LLC**, Alexandria, VA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 605 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/198,575**

(22) Filed: **Mar. 5, 2014**

(65) **Prior Publication Data**

US 2015/0253004 A1 Sep. 10, 2015

(51) **Int. Cl.**

F23K 5/22 (2006.01)
F23D 11/24 (2006.01)
F23D 11/44 (2006.01)
F23K 5/04 (2006.01)
F23K 5/08 (2006.01)
F23K 5/14 (2006.01)
F23K 5/20 (2006.01)
F23N 1/08 (2006.01)
F23N 1/00 (2006.01)

(52) **U.S. Cl.**

CPC **F23D 11/443** (2013.01); **F23D 11/24** (2013.01); **F23K 5/04** (2013.01); **F23K 5/08** (2013.01); **F23K 5/147** (2013.01); **F23K 5/20** (2013.01); **F23N 1/08** (2013.01); **F23K 2301/101** (2013.01)

(58) **Field of Classification Search**

CPC **F23D 11/443**; **F23D 11/24**; **F23K 5/04**;
F23K 5/08; **F23K 5/147**; **F23K 5/20**;
F23K 2301/101; **F23N 1/08**; **Y02E 20/328**
USPC **165/281**; **237/2 A**, **8 A**; **431/12**, **183**
IPC **F23D 11/24**; **F23N 1/00**; **F23K 5/08**, **5/22**
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

746,525 A * 12/1903 Knobbs **F23D 11/00**
239/474
1,332,667 A * 3/1920 Irish **F23D 11/24**
239/485

(Continued)

FOREIGN PATENT DOCUMENTS

GB 2020795 11/1979
JP 61-157420 7/1986

(Continued)

Primary Examiner — Gregory Huson

Assistant Examiner — Daniel E Namay

(74) *Attorney, Agent, or Firm* — Lau & Associates, LLC

(57) **ABSTRACT**

This invention reduces the amount of carbon monoxide introduced by a combustion system to the atmosphere, by furnishing a systems approach to optimize the amount of oxygen to be chemically combined with fuel upon ignition of both allowing the correct amount of carbon to combine with the correct amount of oxygen thus fully release the thermal energy stored therein. By so furnishing the level of oxygen with carbon of the fuel, more carbon dioxide is produced thus proportionally reduces the amount of carbon monoxide released to the atmosphere. The invention provides a heating system that surpasses the net and gross efficiency performance of a natural gas burner.

18 Claims, 8 Drawing Sheets

